START2

Superfund Technical Assessment and Response Team 2 - Region VIII

ENVIRONMENTAL PROTECTION AGENCY
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United States
Environmental Protection Agency

Contract No. 68-W-00-118

TARGETED BROWNFIELDS ASSESSMENT REPORT

CENTENNIAL PARK
Helena, Lewis and Clark County, MT

TDD No. 0102-0001

APRIL 12, 2001

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In association with: Tetra Tech EM, Inc.
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April 24, 2001

Randy Lilje
Director of Parks and Recreation
City of Helena
316 N. Park Avenue
Helena, MT 59623

Dear Randy:

Enclosed are twelve copies of the draft Targeted Brownfields Assessment Report for Centennial Park prepared by URS Operating Services, Inc. This report describes the current site conditions, describes the plans for future site development, discusses potential risks to future users, and makes recommendations for additional sampling.

Please distribute these copies to those people with the City and Open Space Council who have an interest in reviewing it. I would appreciate input and feedback from all interested parties. I am also providing this document to the Montana Department of Environmental Quality for their input. If there is incorrect information, additional information not included, questions or comments please let me know. This document is for the City's use, and I want to be sure that it meets your needs to the extent possible within the scope of EPA's brownfields program.

Once I have received comments, I will have URS revise the document accordingly, and I will have them proceed with preparing a Field Sampling Plan.

I would like to get comments back from everyone in thirty days. However, if that is not enough time for people to review the document, I can provide additional time.

Please give me a call at 441-1150, extension 224, if you have any questions.

Sincerely,

Rosemary Rowe

Rosemary Rowe

Enclosures

cc: Aimee Reynolds, DEQ w/enclosure
Pat Crowley, DEQ w/enclosure

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TARGETED BROWNFIELDS ASSESSMENT REPORT

CENTENNIAL PARK
Helena, Lewis and Clark County, Montana

EPA Contract No. 68-W-00-118
TDD No. 0102-0001

Prepared By:
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Geologist

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Approved: J. Miller Date: 4/11/01
Jeff Miller, START2 Geologist, UOS

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TARGETED BROWNFIELDS ASSESSMENT REPORT

CENTENNIAL PARK
Helena, Montana

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1.0 INTRODUCTION

URS Operating Services, Inc. (UOS) has been tasked by the U.S. Environmental Protection Agency (EPA), Region VIII, to conduct a Targeted Brownfields Assessment (TBA) at the Centennial Park site in Helena, Montana. The work is being conducted under the Technical Direction Document (TDD) #0102-0001, EPA Region VIII Superfund Technical Assessment and Response Team 2 (START2) contract, No. 68-W-00-118, and in support of the City of Helena (the City). The City requested brownfields assistance on the former City of Helena Landfill site, which it plans to redevelop as a centrally located community park and recreation facility known as Centennial Park.

2.0 OBJECTIVES

The objective of this TBA is to conduct an environmental assessment to determine, using existing data to the extent possible, if there are any environmental impediments to the City plan for redevelopment of the site. If any impediments are identified, appropriate remedial actions will be recommended. A TBA provides information as to whether there is a direct health and/or environmental threat at the site, or whether one would be created by the planned redevelopment.

Previous investigations have been conducted at the site to characterize fill materials, groundwater, and landfill gas present at the landfill and potentially migrating to off site areas. Existing data, and any additional data collected as part of this TBA, will be used to evaluate environmental risks associated with future site redevelopment. Specific objectives of this TBA are:

- Document current site conditions including the status of any corrective actions;
- Compile existing site sample analytical data from fill material, groundwater, surface water, and air samples to determine existing extent and level of contamination;
- Identify and gather any additional data needed to perform the assessment;
- Compare existing analytical results to published criteria, such as Montana Circular WQB-7 Numeric Water Quality Standards, to document potential risks to future users; and

- Provide direction for the mitigation of any health impacts that may be discovered by recommending appropriate remedial actions.

3.0 BACKGROUND

3.1 SITE LOCATION AND DESCRIPTION

The Centennial Park site covers approximately 60 acres located in north-central Helena, Montana (Figure 1). The site may be subdivided into three areas or phases based on the operational history of the landfill (Figure 2). The oldest part of the landfill (Phase 1) includes approximately 27 acres, most of the southern half of the site (U. S. Environmental Protection Agency (EPA) 1988). Phase I also includes approximately seven acres of land occupied by the YMCA and Montana National Guard Armory since 1977, located in the southeast corner of the site. Other portions of Phase I have already been redeveloped into a grassed park, which is currently used for soccer, softball, and jogging (EPA 1988). Phase II encompasses approximately 10 acres of land in a wedge shape, bounded by Phase I to the southeast, by Carroll College to the west, and by railroad tracks and Phase III to the northeast. Between Phase I and Phase II lies an old railroad bed, which enters the site at the southwest and curves to the northeast, forming the boundary between Phases I and II (Figure 1). In the northeast, this railroad bed intersects another railroad bed (with tracks still intact), which in turn extends some distance to the southeast. The City intends to redevelop this later section of track into a trail, running from the landfill area to the southeast to North Montana Avenue. Phase III covers approximately 24 acres along the north of the site, bounded to the north by the Bill Roberts Golf Course, by commercial property to the east, by Elk River Concrete Products Company to the west, and by Phase II to the south. The City of Helena Waste Transfer Station, used to collect municipal waste for transfer to the new City landfill elsewhere in the Helena Valley, occupies the northwest corner of the Phase III area.

The entire site has been closed to dumping and is capped in some manner. Phase III, where the most recent dumping has occurred, is in the process of being closed under the Subtitle D regulations and is required to be capped with up to two feet of compacted clay (City of Helena 2000). The other two phases have been capped with an indeterminate thickness of alluvial soils. Vegetative cover over the site varies. The Phase I and II areas are currently utilized as parks.

The site is located in Sections 19 and 30, T. 10 N., R. 3 W., of the U.S. Geological Survey (USGS), Helena, Montana 7.5 Minute Quadrangle (Figure 1). The site is located between the 1200 and 1300 blocks of North Main Street, north of Lyndale Avenue, south of the Montana Rail Link line and Bill Roberts Municipal Golf Course, and east of Carroll College, within the Helena city limits, Lewis and Clark County, Montana (Figure 2). The City owns the entire site, minus a small portion on the south end, which is currently owned by the state of Montana. This portion is scheduled to be transferred to the City within the next two years (City of Helena 2000).

3.2 SITE HISTORY AND USE

The Helena landfill site was in operation from the late 1800s until 1994. Open burning was the primary waste disposal method at the site prior to 1970. In 1970, sanitary landfill practices were implemented and the burning of wastes was stopped. The City has been the owner of the landfill property since the 1950s and for nearly 40 years the site was the sole disposal location of municipal waste for Helena residents. Dumping operations began at the south end of the site and proceeded to the north over the years. The disposal of waste in Phase I was completed by the late 1970s. The fill in this area averages 25 feet in depth (EPA 1988). Between 1970 and 1977, an estimated 162,000 tons of municipal waste were deposited in this area along with an equal tonnage of construction rubble. It has also been reported that some paint solvents, which were received at the rate of 6 barrels a week, were mixed with construction debris and disposed (EPA 1988).

Phase II of the landfill was in operation from the late 1970s until approximately 1983. Landfill practices consisted of the excavation of cells approximately 75-100 feet wide and 8-12 feet deep in the native alluvial soils (EPA 1988). Refuse delivered to the cells was dumped, leveled and compacted. Soil blankets were allegedly placed between layers of waste in each cell and soil barriers were left between adjacent cells. The volume of wastes disposed was estimated to be about 159,000 tons (EPA 1988).

Phase III of the landfill was activated in 1982. Average annual quantity of wastes disposed until 1997 was approximately 35,000 tons. This final unit of the landfill is currently in the process of closure under Subtitle D regulations. A two-foot-thick clay cap has been installed and reseeding has taken place (City of Helena 2000).

3.3 SITE CHARACTERIZATION

3.3.1 Geology

The Centennial Park site is located at the edge of Helena Valley, a small intermountain basin. It is surrounded by folded and faulted rocks ranging in age from pre-Cambrian to Cretaceous. These rocks are primarily limestone, shale, and quartzite with thicknesses of over 5,000 feet (EPA 1988). The valley floor is composed of a thick formation of unconsolidated material (lacustrine and alluvial deposits) of Tertiary and Quaternary Age.

This site is located near the mouth of Last Chance Gulch along the southern edge of the Helena Valley (Figure 1). The gulch is an alluvial filled valley composed of layers, lenses, and mixtures of unconsolidated clay, silt, sand, gravel, and cobbles. The alluvium is underlain by the Precambrian Helena formation (siliceous dolomite with limestone), which forms the bedrock in the vicinity of the YMCA and National Guard Armory, and by a Tertiary-age intrusion (diorite porphyry), which forms a bedrock high in the Carroll College area (City of Helena 2000; Hydrometrics 1990).

The thickness of the alluvium increases toward the north away from Last Chance Gulch. For instance, in the landfill area bedrock was encountered at 28 feet near the YMCA building, while a well completed to a depth of 60 feet in the northwest of Phase III was still in alluvium (EPA 1988).

3.3.2 Hydrogeology

Groundwater occurs in both the unconsolidated alluvium and underlying bedrock beneath the site. Depth to groundwater is approximately 30 feet at the southern edge of the landfill, deepening to approximately 60 feet at the northwestern boundary. Groundwater flows generally to the north-northwest from the site. More specifically, the groundwater flow direction is slightly east of north beneath the southern portion of the landfill, then bends to the north-northwest around the lower permeability shallow bedrock high under Carroll College. An average gradient of 0.05 feet per foot has been computed for the site (Hydrometrics 1990). Groundwater likely follows a complex path through the irregular,

heterogeneous layers of varied permeability of the alluvium. Hydraulic conductivity through the alluvium has been determined to be approximately 2-5 ft/day (Hydrometrics 1990; Hydrometrics 1999a).

Recharge to the alluvial system is through runoff from the mountains to the southwest of the site (via Last Chance Gulch), direct precipitation, irrigation and lawn watering, and by runoff transported through City storm drains (EPA 1988; Hydrometrics 1990).

3.3.2 Hydrology

The Centennial Park site is located in the Missouri River drainage basin. The site is approximately 11 miles southwest of the Missouri, which flows generally from south to north in this area. Surface water in the site area generally flows to the northwest toward Tenmile Creek, which lies approximately two miles away. Last Chance Gulch is an intermittent stream that has been diverted through a concrete culvert routed beneath the landfill (EPA 1988). This culvert discharges immediately north of the railroad tracks of Montana Rail Link, which forms the north boundary of Phase III. Discharge may vary greatly both seasonally and with local precipitation events. Discharge was estimated to be 1,000 gallons per minute on June 25, 1982 (EPA 1988), and 52 gallons per minute in June 1990 (Hydrometrics 1990). The stream then flows approximately 200 feet farther north where it discharges into a pond. Historically, much of the area north of the landfill and in the Bill Roberts Golf Course has been dredged for gold.

3.4 PREVIOUS INVESTIGATIONS

Much investigative work, begun in the 1970s and currently ongoing, has been performed at the landfill area and in the immediate surroundings. Initial studies performed by the USGS focused mainly on the hydrogeology of the area:

- Wilke, K. R., D. L. Coffin. 1973. *Appraisal of the quality of groundwater in the Helena Valley, Montana*, (Water-Resources Investigations 73-32)

- Coffman, Don. 1976. *Site Evaluation Investigation of the Helena City Landfill* (USGS for the City of Helena Engineering Department)

- Moreland, J. A., R. B. Leonard, T. E. Reed, R. O. Clausen, W. A. Wood. 1979. *Hydrologic data from selected wells in the Helena Valley, Lewis and Clark County, Montana*

- Moreland, J. A., R. B. Leonard. 1980. *Evaluation of shallow aquifers in the Helena Valley, Lewis and Clark County, Montana*

In the early 1980s, studies began to focus on groundwater quality and methane gas generation from the landfill:

- Environmental Protection Agency. 1981. *Landfill Gas and Leachate Monitoring: Helena, Montana-A Technical Assistance Panels Program Report,* NTIS Report No. 908/6-81-002, by Fred C. Hart and Associates

- F and M Consultants. 1982. *Helena Landfill Investigation*

- Hydrometrics. 1982a. *Hydrogeologic Investigation of the Helena Landfill*

- Hydrometrics. 1982b. *Groundwater Monitoring Program, City of Helena Landfill, Helena, Montana*

The landfill was first evaluated under the Superfund program in 1985 when the Montana State Department of Health and Environmental Sciences (MDHES) (now the Montana Department of Environmental Quality (MDEQ)) conducted methane gas sampling and conducted a Preliminary Assessment (PA). Further Superfund site investigation of Phases I and II was conducted by the EPA Field Investigation Team (FIT) in 1987 and 1989 (EPA 1988; EPA 1989). It was subsequently determined that, although groundwater contamination (particularly tetrachloroethene (PCE)) had been documented, the site should not be covered under the Superfund program, but rather under the State of Montana's Comprehensive Environmental Cleanup and Responsibility Act (CECRA) regulations as administered by the MDHES (City of Helena 2000). The following summarizes Superfund work completed at the site:

- Montana Department of Health and Environmental Sciences. 1985. *Preliminary Assessment for the Helena Landfill, Helena, MT*

- Environmental Protection Agency. 1988. *Analytical Results Report, Helena Landfill, Helena, Montana*

- Environmental Protection Agency. 1989. *Analytical Results Report, Helena Landfill, Helena, Montana*

Environmental assessment of the groundwater contamination and methane gas generation from the landfill continued by the City through the 1990s. Landfill closure studies, as well as the assessment of potential corrective measures, were also conducted to ensure that proper landfill regulatory closure would be achieved. To fulfill the requirements set forth in the Administrative Rules of Montana (ARM) 16.14.708 for assessing potential corrective measures for groundwater contamination at landfills in the state, a Corrective Measures Assessment (CMA) was completed in 1995 (Hydrometrics 1995). The CMA presented six corrective measure alternatives, which were screened on the basis of technical implementability, effectiveness and protectiveness, and relative cost. The alternative selected involved continued groundwater monitoring, continued use of institutional controls (such as City ordinances requiring each residence within city limits to connect to the city water supply, prohibited well drilling within city limits, and requiring that there be no cross-connection between any private wells and the City water distribution system), and the use of existing corrective actions (landfill closure, clay capping, and an extension of the storm drain that passes underneath the landfill). Subsequent addenda to the CMA (in 1996 and 1999) have recommended the addition of a landfill gas extraction and treatment system (in an attempt to lower concentrations of PCE in the groundwater and increase the protection of adjacent buildings from migrating methane gas), as well as the installation of a groundwater extraction system along the northern boundary of the landfill (Hydrometrics 1999a; Hydrometrics 1996). Both of these systems had been installed by summer of 2000 (City of Helena 2000) (Figure 2).

- Hydrometrics. 1990. *Hydrogeologic Investigation of the City of Helena Landfill*

- Hydrometrics. 1993. *Revised Helena Landfill Closure Plan*

- Hydrometrics. 1994. *Sampling and Analysis Plan for City of Helena Landfill Groundwater Monitoring Activities*

- Hydrometrics. 1995. *Corrective Measures Assessment, City of Helena Landfill, Helena, Montana*

- Hydrometrics. 1996. *Addendum to Corrective Measures Assessment for the Helena Landfill, Helena, Montana*

- Hydrometrics. 1999a. *Second Addendum to Corrective Measures Assessment for the Helena Landfill, Helena, Montana*

Additional work has been performed in areas adjacent to the landfill. A site assessment and subsequent voluntary cleanup were completed in 1996 and 1997 at the Montana Power Company (MPC) Manufactured Gas Plant (MPG) located just southwest of Phase III of the landfill (Figure 2). Work conducted included the excavation and off site disposal of MPG waste material and the installation and sampling of groundwater monitoring wells. Additionally, in April 1998 a gasoline release was discovered on the MPC property, east of the MPG cleanup area (Figure 2). Impacted soil was excavated and a soil vapor extraction (SVE) system was installed. Groundwater monitoring continues at both sites (MPC 1996; MPC 1997; MPC 2000).

The migration of methane gas onto Carroll College property has been investigated separately by the college.

- Montana Power Company. 1996. *Helena Manufactured Gas Plant Remediation Report*

- Montana Power Company. 1997. *Site Assessment Report, Montana Power Company, Former Manufactured Gas Plant, Helena, Montana*

- Montana Power Company. 2000. *Quarterly Groundwater Monitoring and Remedial Systems Operations Report, Montana Power Company Operating Center, 1315 North Main Street, Helena, Montana*

- JRW Environmental Consulting. 1999. *Results of Field Investigation of Landfilled Areas Adjacent to the Carroll College Grounds Building,* letter to Carroll College

- Olympus Environmental. 1998. *Carroll College Site Assessment*

4.0 CURRENT SITE CONDITIONS

4.1 KNOWN SITE CONTAMINATION

4.1.1 Groundwater Pathway

On going semiannual and quarterly groundwater monitoring has shown that initial corrective actions have not decreased PCE levels below the Maximum Contaminant Level (MCL) of 0.005 milligram per liter (mg/L) in downgradient wells (Figure 3) (Hydrometrics 2000a). (MCLs are the maximum permissible levels or concentrations of a contaminant in water that is delivered to any user of a public water system. MCLs are enforceable standards. Compliance with drinking water criteria is required when a potable aquifer has been contaminated). A report on September 1999 and December 1999 groundwater quality (Hydrometrics 2000a) concluded the following:

- For the December 1999 event, nitrate + nitrite and PCE, were reported at concentrations exceeding MCL criteria in downgradient wells. MCLs were exceeded for nitrate + nitrite, benzene, and cyanide in upgradient wells.

- Historically, MCLs for PCE, trichloroethene (TCE), and nitrate + nitrite have been exceeded in downgradient wells.

- Concentrations of PCE in some downgradient wells have consistently exceeded the MCL.

- A potential source of the nitrate + nitrite and cyanide is the historic manufactured gas plant that operated just east of the landfill (on MPC property). (Note: The

benzene detections in the upgradient well may also be attributed potentially to the MPC property, based on subsequent findings (Montana Power Company 2000)).

- Metals and arsenic concentrations in groundwater samples have historically been low (typically below laboratory detection limits).

Groundwater sampling conducted in December 2000 showed PCE concentrations of as much as 6.0 micrograms per liter (μg/L) in downgradient wells (Energy Laboratories 2001).

4.1.2 Air Pathway

All municipal landfills generate landfill gases as long as organic wastes remain available for biological decomposition. The primary landfill gas generated at the Helena Landfill is methane. Methane probes have been installed along the entire perimeter of the landfill and have been monitored on a monthly basis. In response to potential high (greater than the Lower Explosive Limit (LEL) (i.e., the lowest concentration of a gas in air that is sufficient to be ignited and produce a flame) concentrations of methane in the YMCA and Armory buildings, a landfill gas extraction system was installed within Phase I of the landfill in 1998 (Hydrometrics 1998b) (Figure 4). Additionally, an evaluation of methane migration on the west side of the landfill (near Carroll College) performed in late 1997 determined that significant concentrations of methane were detected up to 150 feet away from the landfill (Hydrometrics 1998a). This led to the installation of a passive methane extraction system along the western boundary of the landfill (Figure 4). Data from the February 2001 methane monitoring event for both methane extraction systems showed that concentrations of methane exceeded 100% of the LEL (5% methane) in one methane probe (nine probes were not sampled due to access problems) and one gas extraction well near the YMCA (Hydrometrics 2001). Continuous monitors placed in the basements of the YMCA and Armory buildings, as well as at the Carroll College Shop and at the Elk River facility (west of the Waste Transfer Station) showed no presence of methane during this sampling event.

A specific gas (dichlorodifluoromethane) is being treated for in the methane extraction system installed near the YMCA. Dichlorodifluoromethane is a colorless, non-corrosive gas, nearly insoluble in water, which has been used historically as an aerosol propellent

(such as in deodorant and hair sprays). Extraction wells have been fitted with a carbon filtration system designed to reduce the emissions of this pollutant.

4.1.3 Soil Exposure Pathway

The entire landfill surface has been covered in some manner. The latest phase of the landfill (Phase III) has been covered with 18 to 24 inches of compacted clay as per ARM and the Resource Conservation and Recovery Act (RCRA) Subtitle D landfill closure requirements (Hydrometrics 1990). It is less clear how much cover and of what type has been installed over the remaining two phases of the landfill. These phases of the landfill were closed before the promulgation of ARM (Title 16, Chapter 14, Subchapter 5, Section 16.14.521 (2), April 1991) and RCRA Subtitle D (40 CFR Part 258, Section 258.60) requirements pertaining to landfill covers. The CMA appears to consider only the closing of Phase III. According to EPA (1988), Phase I has been capped by 2 to 4 feet of sandy, clayey alluvial soils. Conversely, a graphic included in a presentation to the City of Helena Commissioners shows that Phase I "includes a 6" topsoil cap" (Hydrometrics 1999b).

It is also unclear if deed restrictions and other such institutional controls prohibit the construction of any facility within the landfill boundary. If any such intrusion occurred, there would then be the threat of exposure to landfill constituents.

4.1.4 Surface Water Pathway

Surface water at the site is mostly limited to surface runoff during storm events and the outfall from the Last Chance Gulch culvert to the north of the site. The EPA FIT collected two surface water samples (one upstream and one downstream from the landfill) from Last Chance Gulch in the fall of 1987 (EPA 1988). Chloroform was detected in the downstream sample at 7 μg/L and was attributed to the site. Inorganic analysis of the samples indicated no release of contaminants to downstream surface water (EPA 1988). The EPA FIT again collected two surface water samples from Last Chance Gulch in the winter of 1989 (EPA 1989). Chloroform was again detected in the downstream sample at 6 μg/L. No semivolatile or pesticide contamination was detected. Inorganic data results again did not show elevated concentrations of any contaminants. No possible explanation was given for the chloroform

in the surface water, except for detections in groundwater. The periodic discharge of chlorinated pool water (then reacting with organic matter) was mentioned as a potential contributor (EPA 1989). No other surface water sampling information has been found for the site.

4.2 REMEDIAL ACTIONS TO DATE

4.2.1 Groundwater Remediation

In order to address the PCE migrating downgradient of the landfill, a groundwater extraction system was installed to the north of the landfill in 2000 (Hydrometrics 2000b). The system is comprised of three extraction wells whose discharge lines are connected into a single line, which is then routed to an irrigation pond on the Bill Roberts Golf Course (Hydrometrics 1999a, Figure 3-1) (Figure 2). Irrigation water is then pumped from this pond with the anticipation that any PCE in the water will be volatilized. This system is only operated for nine months of the year.

The system has been in operation since June 2000. It was recommended that the system be operated and monitored and that quarterly samples be taken for a period of two years after start up in order to determine its effectiveness. While no laboratory results have been reviewed for this report, samples analyzed in the field during system start-up showed that concentrations of PCE in sprinkler effluent were less than 0.5 μg/L (Hydrometrics 2000b).

4.2.2 Landfill Gas Remediation

Two landfill gas extraction systems have been installed at the landfill site (City of Helena 2000) (Figures 2, 4). The first methane extraction system was installed adjacent to the YMCA in 1998. This system consists of six extraction wells spaced along the west of the YMCA and Armory buildings that are plumbed into a mechanical service building to the north of the YMCA (Figure 2). Results of the latest available monthly monitoring (February 2001) show that stack gas methane concentrations for the system were 6.6%. Methane probes installed in the basements of both the YCMA and the Armory showed no detection of methane (Hydrometrics 2001).

A second methane extraction system was installed along the westside of the landfill to address concerns expressed by Carroll College about methane migration on to their property. This system consists of a passive interception trench which vents at its north end. Results of the latest available monthly monitoring (February 2001) show that stack gas methane concentrations for the system were 7.9%. A methane probe installed in the basement of the Carroll College Shop showed no detection of methane (Hydrometrics 2001).

4.2.3 Other Corrective Measures and Institutional Controls

Other corrective measures and institutional controls have been implemented at the site including landfill closure, clay capping, storm drain extension and city ordinances. These measures and controls are protective of human health by limiting potential exposure pathways. The closure of the landfill in 1994 ensures that no addition of any waste will occur and controls the source area by limiting its volume. The release of contaminants was limited by capping the most recently completed phase of the landfill (Phase III). This reduces the mobility of any potential contaminants existing as waste in the landfill by reducing the amount of landfill leachate generation. Other efforts to reduce leachate generation include the extension of the Last Chance Gulch storm drain beyond the landfill boundary and the recent installation of new storm drains south of the landfill, which were believed to have been leaking and contributing to the leachate problem.

Existing City ordinances require each residence within city limits to connect to the city water supply for potable water use (Title 3, Chapter 2, Section 10). This ordinance reduces the potential for human exposure by providing an alternative potable water source other than the impacted groundwater. Additional wells drilled within the city limits also are prohibited by a ban on well drilling within city limits (Title 3, Chapter 11), thereby restricting access to impacted groundwater. Title 3, Chapter 11, Section 3 requires that there be no cross-connection between any private wells and the City water distribution system.

An unknown number of private residences to the northwest of the site have been taken off private wells and placed on City water.

5.0 SITE REDEVELOPMENT PLANS

The City has developed a Master Plan for the site, which entails its redevelopment into a centrally located community park (City of Helena 2000). There is no known private developer interested in the property as of December 2000. The City is the long time owner of the property and remains the owner. Currently, a small portion of the property on the south end belongs to the state of Montana and is scheduled for transfer to the City within the next two years, after the state's need for the communication antenna network on the property is eliminated (City of Helena 2000). According to the application for TBA assistance submitted by the City, key stakeholders that have an interest in seeing that such redevelopment occurs include the YMCA, Carroll College, local soccer and softball organizations, the Helena School District, property owners in the Great Northern Development Area to the south, the Downtown Business Improvement District, the Helena Improvement Society, and the citizens of Helena. It should also be noted that the community has approved a $5,000,000 bond for development of recreation and open space. A significant portion of the open space bond proceeds were dedicated to recreation sites, and specifically the Centennial Park site (City of Helena 2000).

A diagram of the Final Master Plan for the site is shown in Figure 6. As shown on this diagram, facilities planned for the site include the following:

- Six soccer fields and a 96-space parking lot within Phase III;
- A playground and two parking lots (one with 97 spaces, one with 154 spaces) in Phase II;
- An eighteen-hole flying disc golf course within Phases II and III;
- Five softball fields that straddle the boundary between Phase I and Phase II; and
- Three soccer fields, volleyball courts, and a playground in Phase I.

The plan also shows various landscape buffers around the site boundary as well as a slow speed park drive. The TBA application further explains that Centennial Park will connect to nearby Memorial Park through underpasses and trails, as well as serve as the terminus of the community bicycle/pedestrian pathway to the west of the park (City of Helena 2000).

Not shown on the plan is an existing railroad bed which extends from the landfill to the southeast. The City also plans to acquire this property from the current owner and redevelop it into a trail that runs southeast from Centennial Park to North Montana Avenue, a distance of approximately one half mile (Figure 2).

6.0 RISK EVALUATION

6.1 DATA GAPS AND SAMPLING RECOMMENDATIONS

The future land use scenario of redeveloping the railroad bed for use as a trail creates potential exposure risks to recreational users if contaminants are present. Railroad corridors can contain various environmental contaminants, including railroad ties treated with arsenic compounds and creosote; ballast composed of material containing heavy metals (e.g., tailings or smelting slag) or that has accumulated material from leaks or spills; and herbicides that have been applied along corridors to control weeds and grasses. No sampling of the railroad bed has been performed. It is recommended that soil samples be collected along the entirety of this corridor. More specifically, sampling should include:

- Composite samples collected from grids spaced along the railroad bed analyzed for pesticides/PCBs, metals (includes arsenic), and total extractable petroleum hydrocarbons (covers diesel range organics);
- Discrete depth samples (0-2 feet) collected along the railroad bed analyzed for pesticides/PCBs, metals (includes arsenic), and semivolatile and volatile organics;
- Opportunity samples taken from any areas of stained soils discovered in the field;
- Background samples taken in the site vicinity as a means of comparison (particularly for metals concentrations); and
- Appropriate quality assurance and quality control samples such as duplicates (replicates and matrix spike/matrix spike duplicates) and blanks (trip and rinsate).

In addition to the railroad bed sampling discussed above, other sampling at the Centennial Park site is also recommended. First, surface water from Last Chance Gulch has not been sampled since 1989, before the final phase of the landfill was closed (EPA 1989). Chloroform was detected in the downstream sample (just north of Phase III) at 6 μg/L. It is recommended that an upstream (just

south of Lyndale Avenue) and a downstream (just north of Phase III) sample be taken to ensure that surface water conditions have not changed.

6.2 POTENTIAL EXPOSURE PATHWAYS

As described above, the future land use for the site is most likely going to be a centrally located community park. The potential exposure risks to be considered in connection with this land use result from soil excavations, methane gas accumulation, and exposure to surface and groundwaters. Figure 5 displays the Human Health and Ecological Conceptual Site Model that has been designed for the site.

When soils are excavated and exposed, the potential exists for exposure to targets via the air pathway by wind-blown particulate material, as well as via the soil exposure pathway through physical contact (ingestion and inhalation of particulates). Currently, the Master Plan for the site includes additional fill material being placed over the southern part of the landfill. This additional fill, combined with the clay cap installed over Phase III, should prevent direct exposure to wastes. However, exposures could occur during future construction activities or if redevelopment occurs differently from what is now expected. It is beyond the scope of this report to advise on specific site construction techniques. In general, site development planning should include the design of appropriate engineering controls to be implemented to alleviate these potential exposure risks, both during site construction activities and subsequent site operations.

Methane gas accumulation in closed structures (such as offices, storage, or warehouse facilities) could create explosion hazards and potentially impact health risks by exposure via the air pathway (inhalation of volatiles). Two methane extraction systems have already been installed at the site, one along the landfill border with Carroll College to the west and one adjacent to the YMCA and Armory buildings to the southeast (Figure 2). Additional extraction systems should be considered if the construction of other enclosed structures are included in the site redevelopment plans.

Past sampling events have shown little contamination in surface waters at the site, with chloroform being detected in downstream samples at 6-7 μg/L (EPA 1988; EPA 1989). However, a groundwater extraction system has been installed to the north of the site which pumps PCE-contaminated water into surface water (ponds) at the Bill Roberts Golf Course (Figure 2). While the most recent

groundwater sampling event for which data was available (December 7, 2000) showed no detection of PCE in a sample taken from the infiltration gallery well of this system, a water sample taken from one of the three extraction wells (HL-99-3) contained PCE at a concentration of 6.0 μg/L, greater than the MCL (5.0 μg/L). A sample taken from the pond after the initial extraction system start-up (June 2000) showed no detection of PCE (Hydrometrics 2000b). It is unknown if additional sampling of the pond has occurred. If PCE is detected in the pond, exposure could occur through ingestion, inhalation of volatiles, and dermal absorption.

Many potentially threatened domestic wells downgradient from the landfill are now only used for irrigation and the households have been placed on City water supplies. Therefore, potential exposure via the groundwater pathway via ingestion from drinking and dermal absorption from indoor bathing is limited. City ordinances preclude the installation of new wells within City limits. However, dermal absorbtion and inhalation of volatiles from water sprayed for irrigation could still represent potential exposure pathways.

6.3 CONTAMINANTS OF CONCERN

To be determined after sampling activities have been completed.

6.4 COMPARISON TO PUBLISHED CRITERIA

Appropriate comparison criteria for groundwater analytical data for this site should include EPA MCLs, the health-based standards found in the MDEQ Circular WQB-7 Montana Numeric Water Quality Standards (MDEQ 1998), or EPA Region IX tap water Preliminary Remediation Goals (EPA 1999). For soil exposure, EPA's Region III Risk-Based Concentrations or Region IX residential Soil Screening Levels (SSLs) would be appropriate. Comparisons will be performed after sampling activities have been completed.

7.0 PROPOSED REMEDIAL ACTIONS

To be determined after sampling activities have been completed.

8.0 SUMMARY

The Centennial Park site covers approximately 60 acres located in north-central Helena, Montana (Figure 1). The site may be subdivided into three areas or phases based on the operational history of the landfill (Figure 2). The oldest part of the landfill (Phase 1) includes approximately 27 acres, most of the southern half of the site (EPA 1988). Portions of Phase I have been redeveloped into a grassed park, which is currently used for soccer, softball, and jogging (EPA 1988). Phase II encompasses approximately 10 acres of land. Phase III covers approximately 24 acres along the north of the site. The entire site has been closed to dumping and is capped in some manner.

The City of Helena has developed a Master Plan for the site, which entails its redevelopment into a centrally located community park (City of Helena 2000) (Figure 6). The City also intends to redevelop a section of railroad bed, running from the landfill area to the southeast approximately one half mile, into a recreational trail.

Much investigative work, begun in the 1970s and currently ongoing, has been performed at the landfill area and in the immediate surroundings. The detection of a PCE groundwater plume beneath the landfill, as well as concerns about methane gas generation from fill materials, has resulted in the completion of two remedial actions to date. These include the installation of a groundwater extraction system to the northwest of the landfill, as well as two methane extraction systems: a passive interception trench placed along the western boundary of the landfill, and an active system of extraction wells adjacent to the Armory and YMCA buildings (Figures 2, 3, 4).

The future land use scenario of redeveloping the railroad bed for use as a trail creates potential exposure risks to recreational users if contaminants are present. Railroad corridors can contain various environmental contaminants, including railroad ties treated with arsenic compounds and creosote; ballast composed of material containing heavy metals (e.g., tailings or smelting slag) or that has accumulated material from leaks or spills; and herbicides that have been applied along corridors to control weeds and grasses. No sampling of the railroad bed has been performed. It is recommended that soil samples be collected along the entirety of this corridor. To ensure that surface water quality has not changed, it is further recommended that two samples be taken from Last Chance Gulch.

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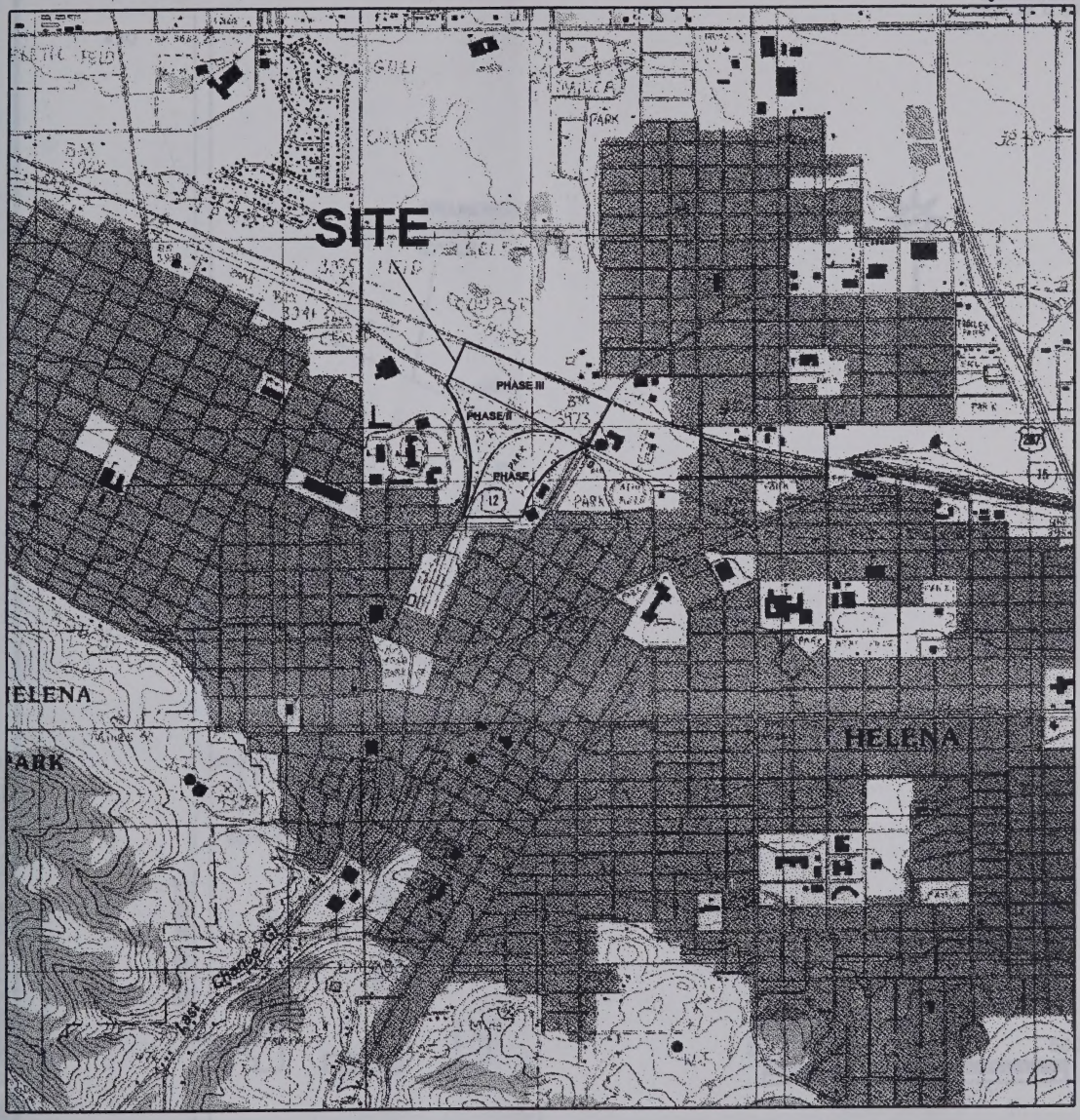

SOURCE: USGS QUADRANGLE
HELENA, MONTANA
PROVISIONAL EDITION 1985

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SCALE: 1" = 2000'

Targeted Brownfields Assessment
UOS Job No. 75-10201.00

Centennial Park
Helena, Montana

Site Location Map
Figure 1

April 2001

URS OPERATING SERVICES

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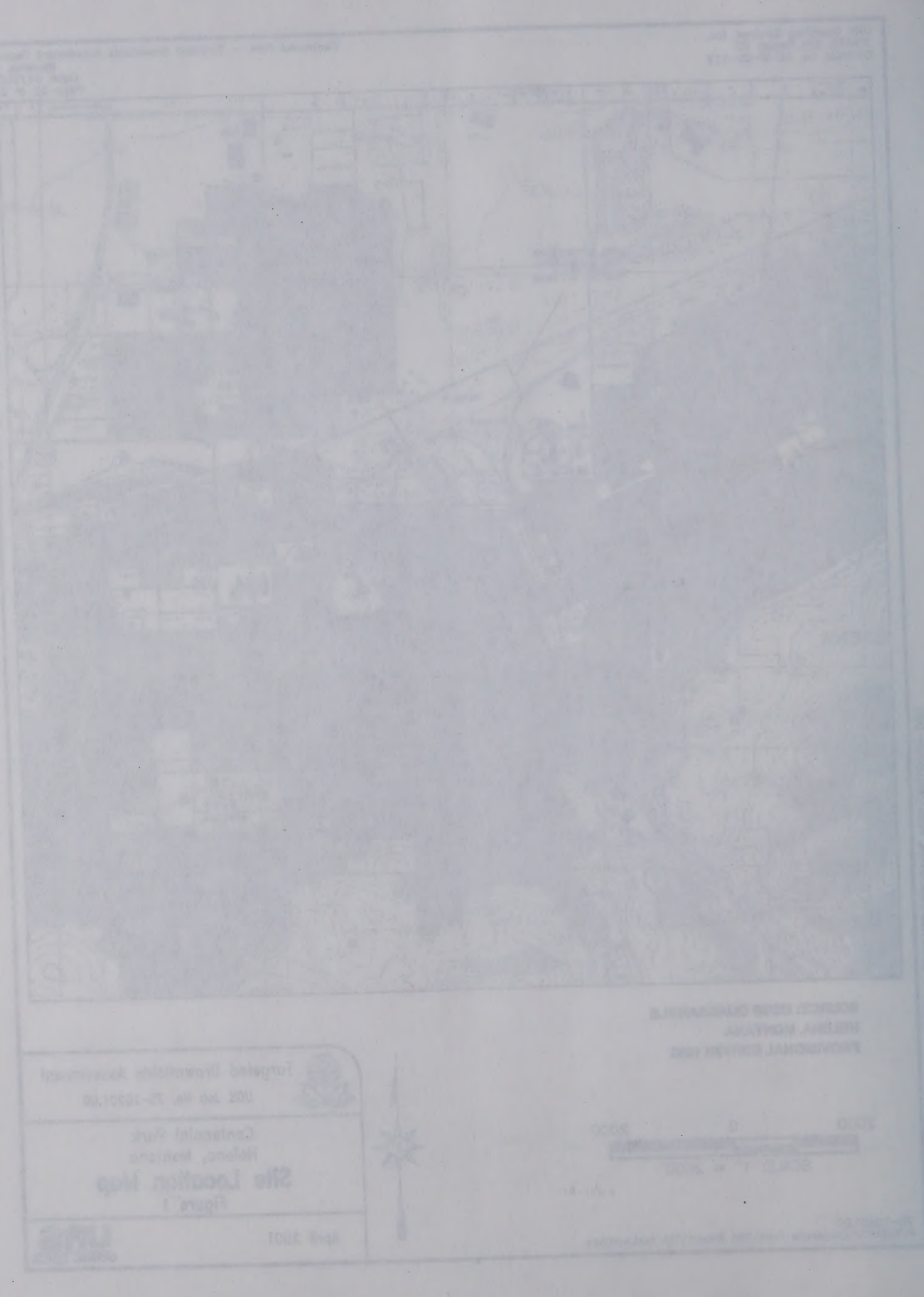

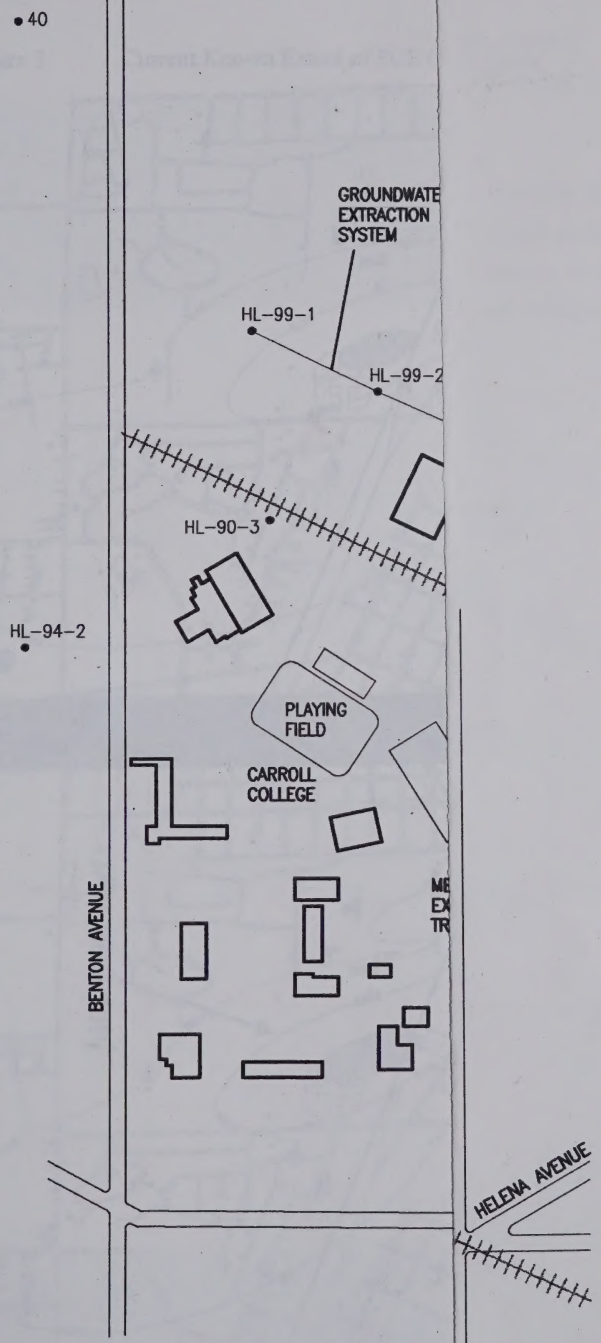

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Targeted Brownfields Assessment
UOS Job No. 75-10201.00

Centennial Park
Helena, Montana

Site Layout and Well Location Map

Figure 2

April 2001

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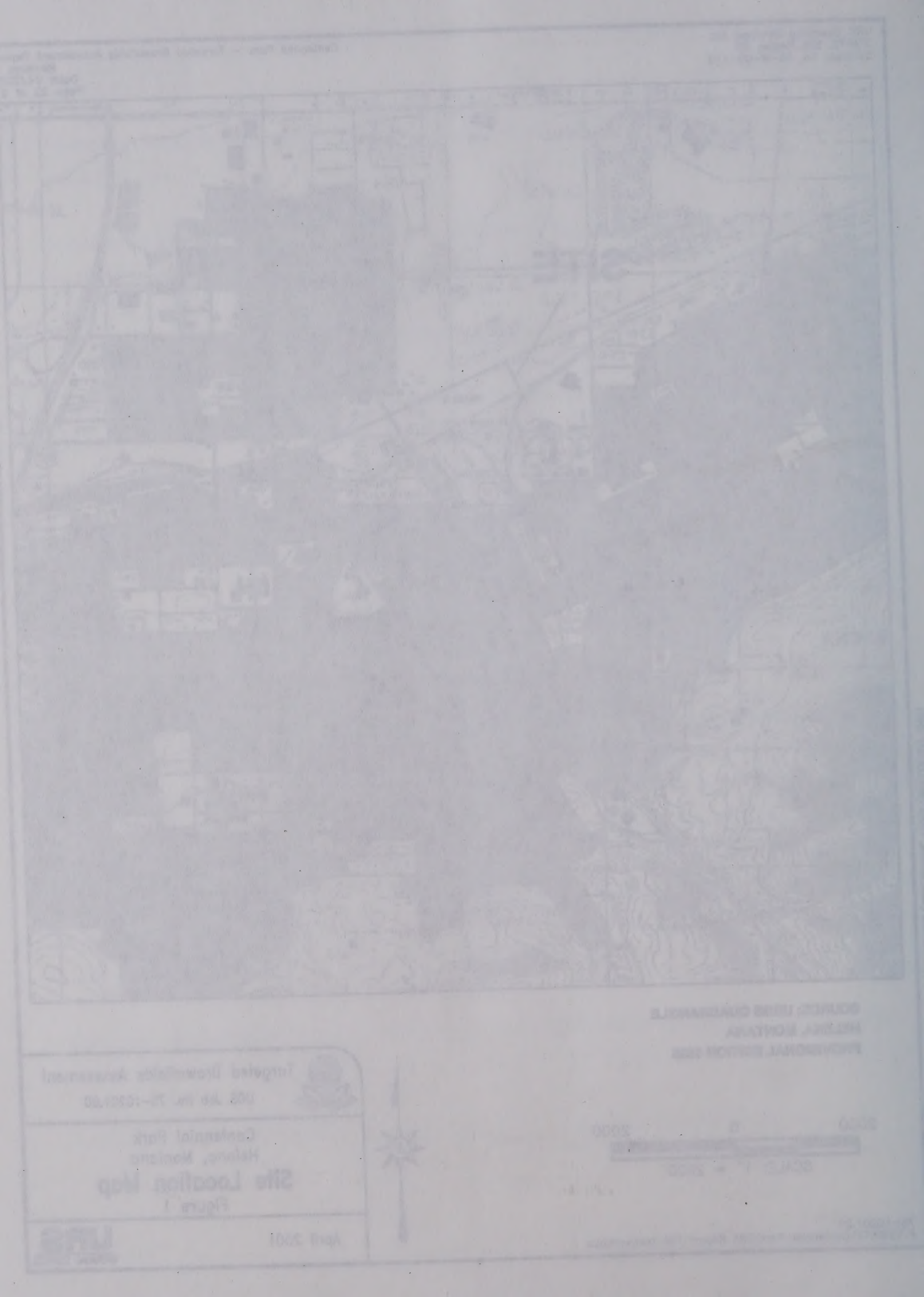

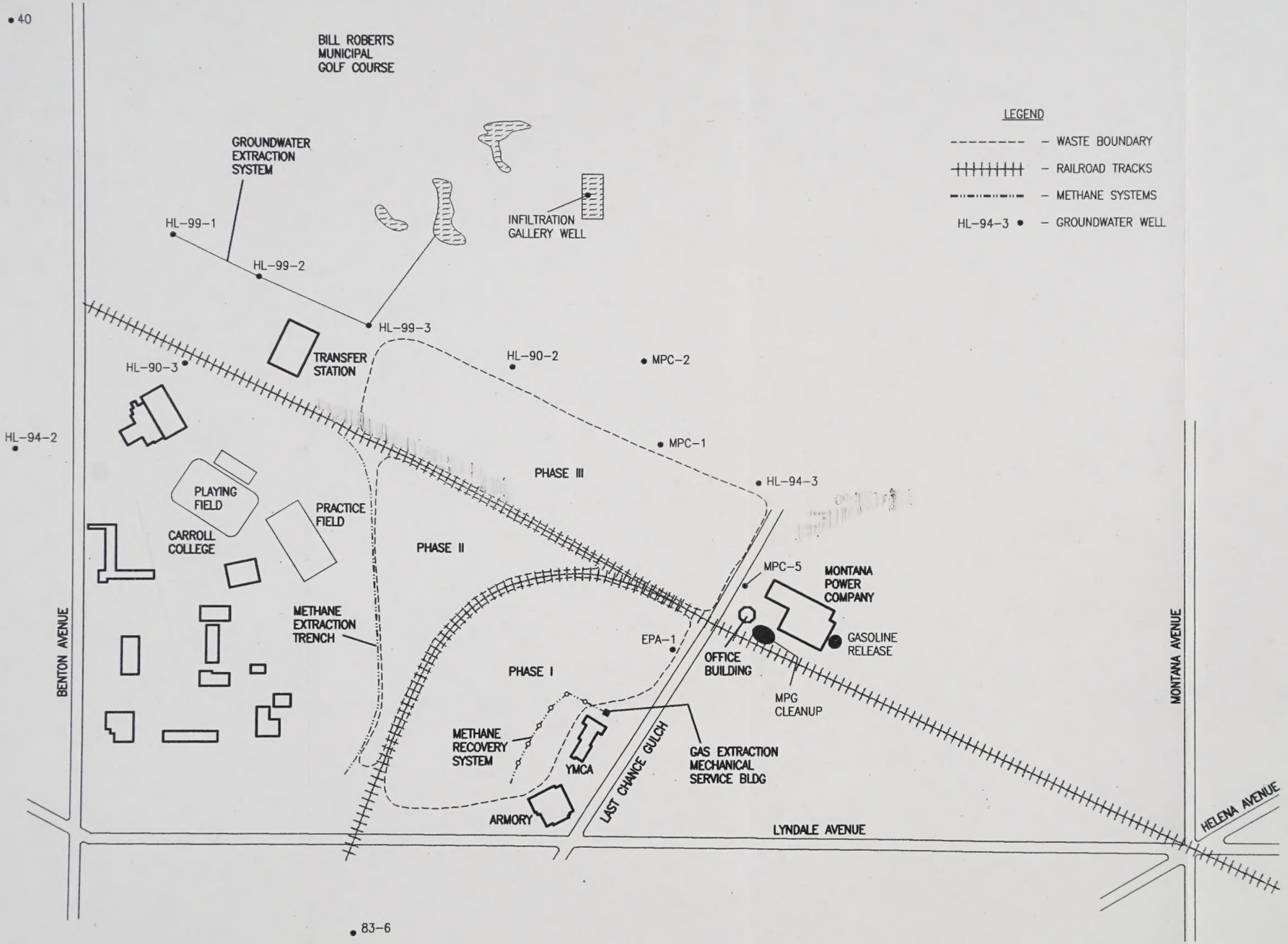

Targeted Brownfields Assessment
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Centennial Park
Helena, Montana

Site Layout and Well Location Map

Figure 2

April 2001

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Figure 3 Current Known Extent of PCE Groundwater Contamination

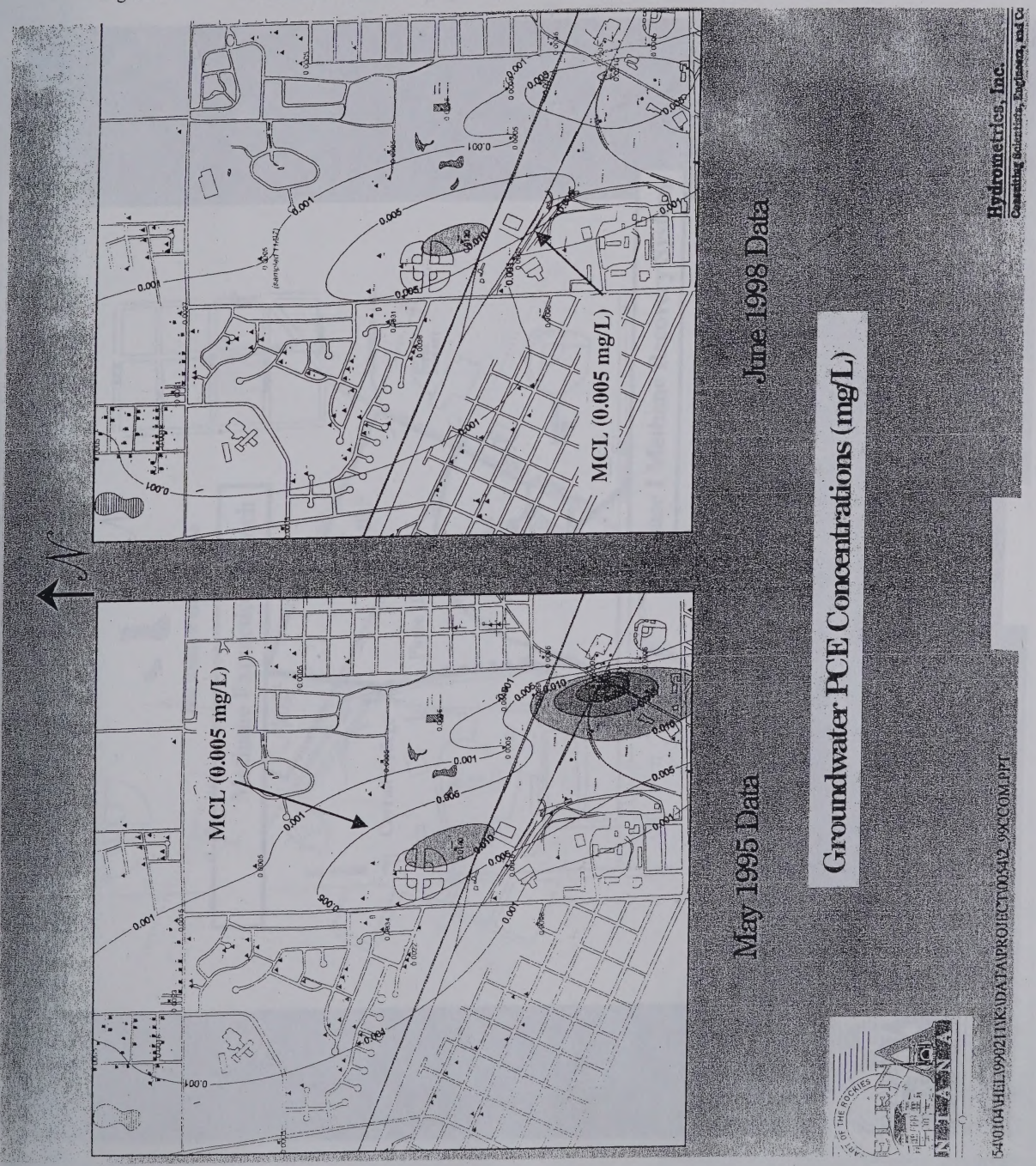
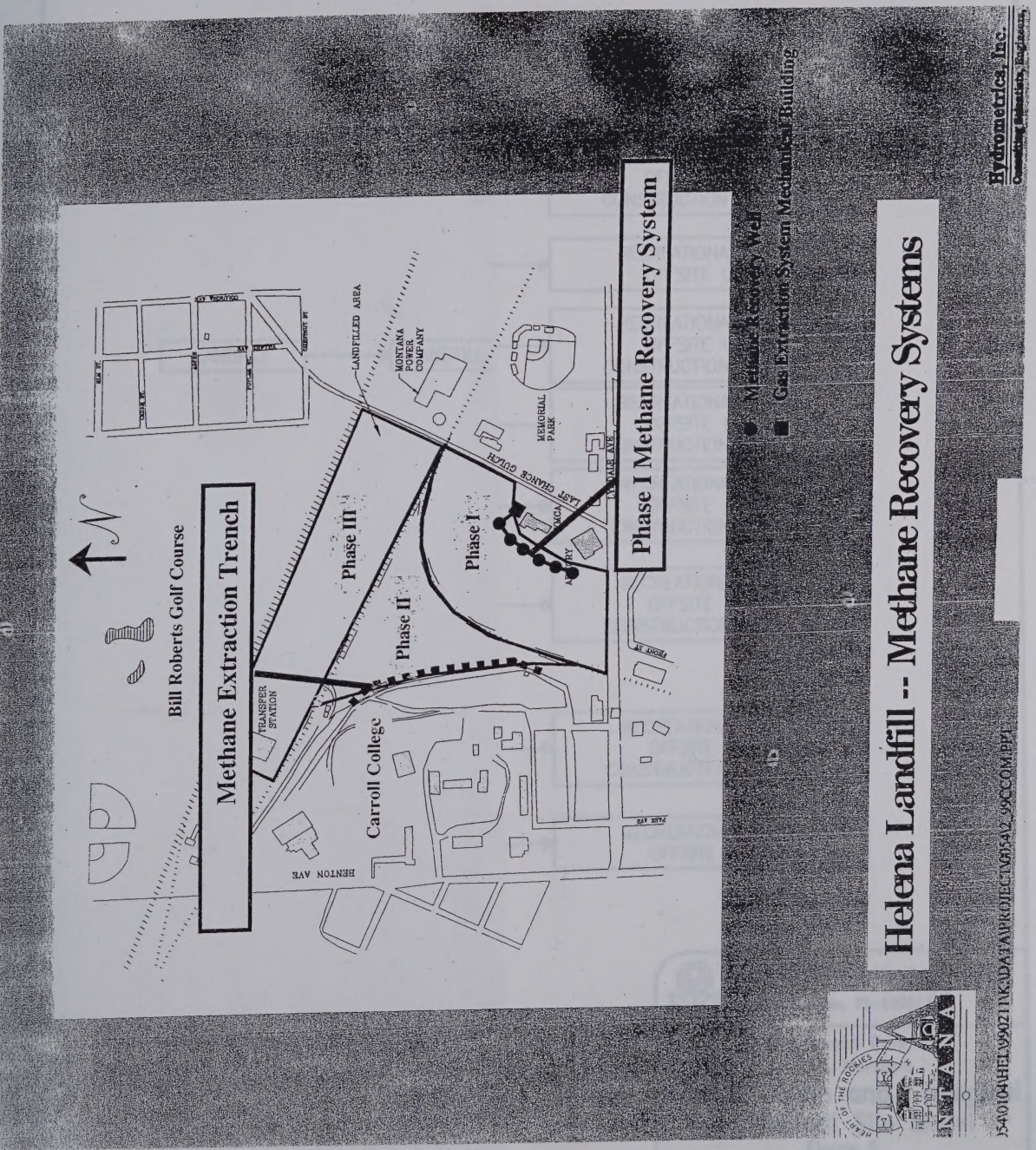
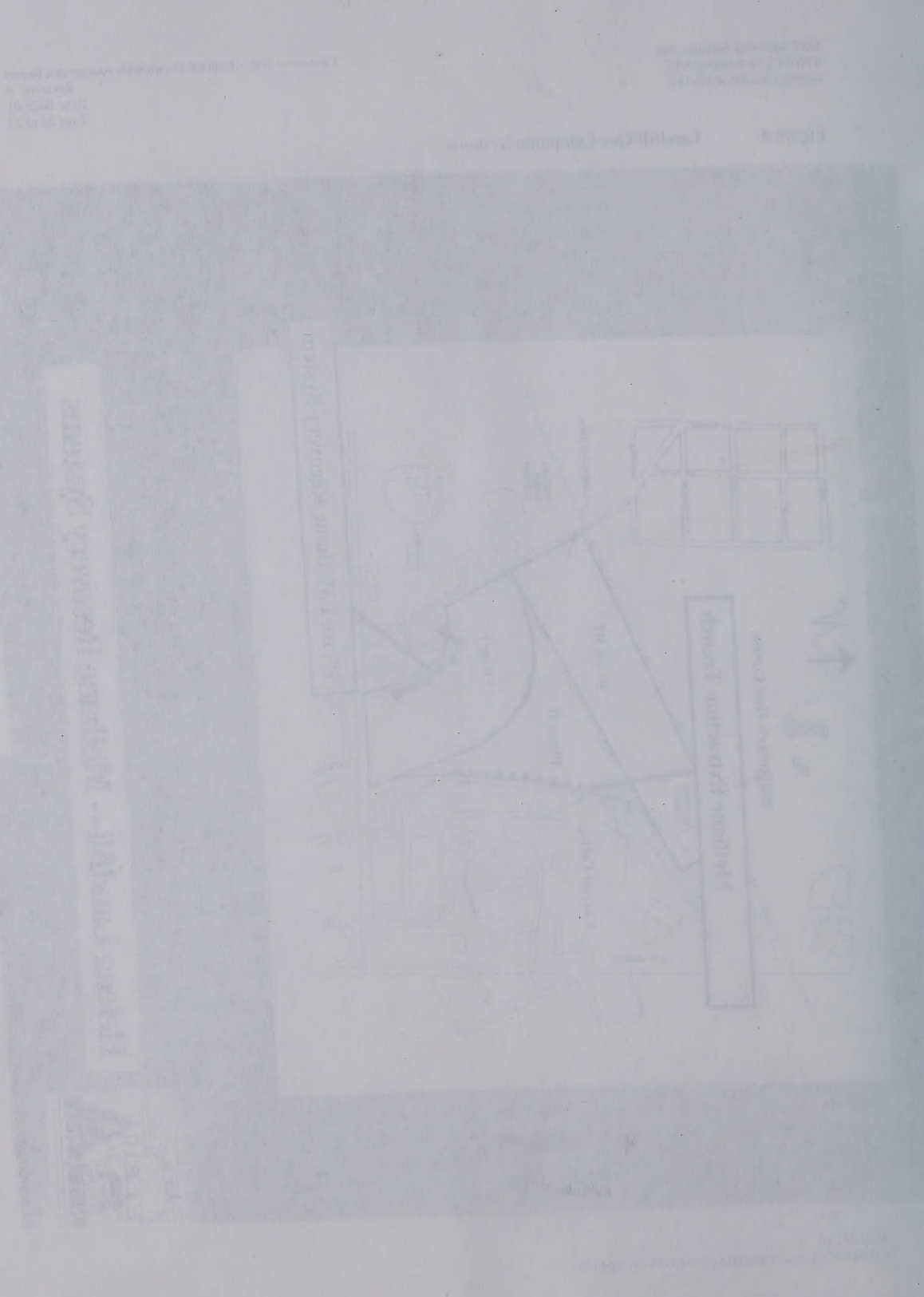
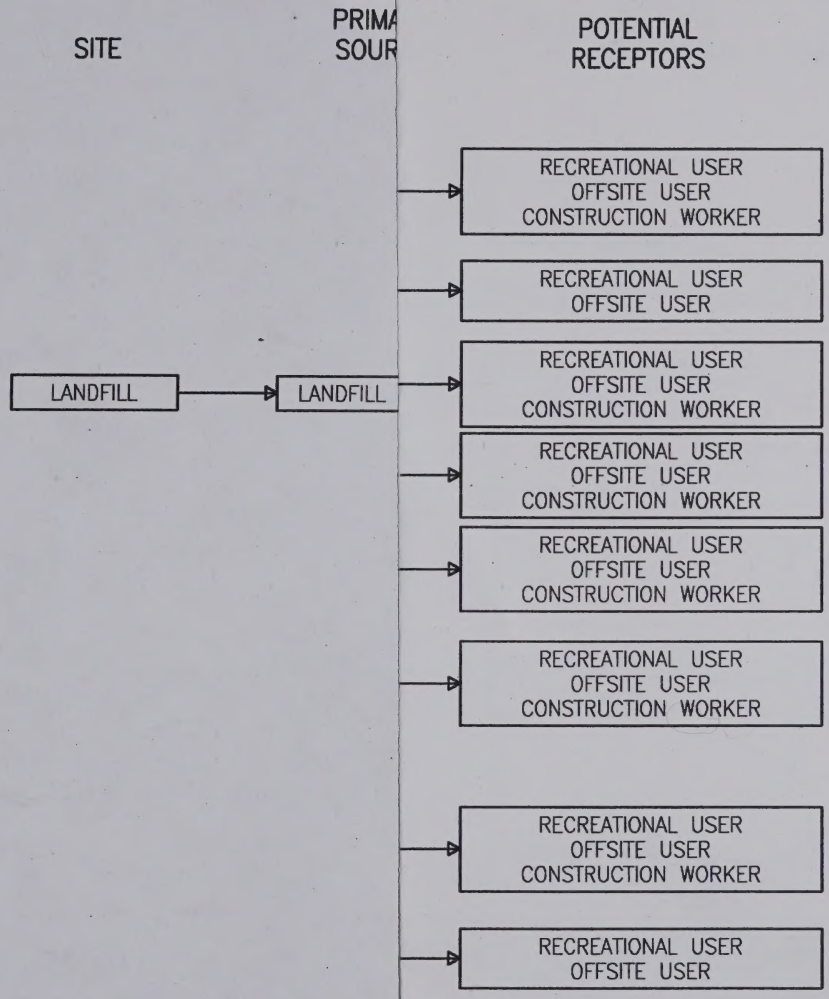


Figure 4 Landfill Gas Extraction Systems







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Targeted Brownfields Assessement
UOS Job No. 75-10201.00

Centennial Park
Helena, Montana

Human Health and Ecological Conceptual Site Model

Figure 5

April 2001

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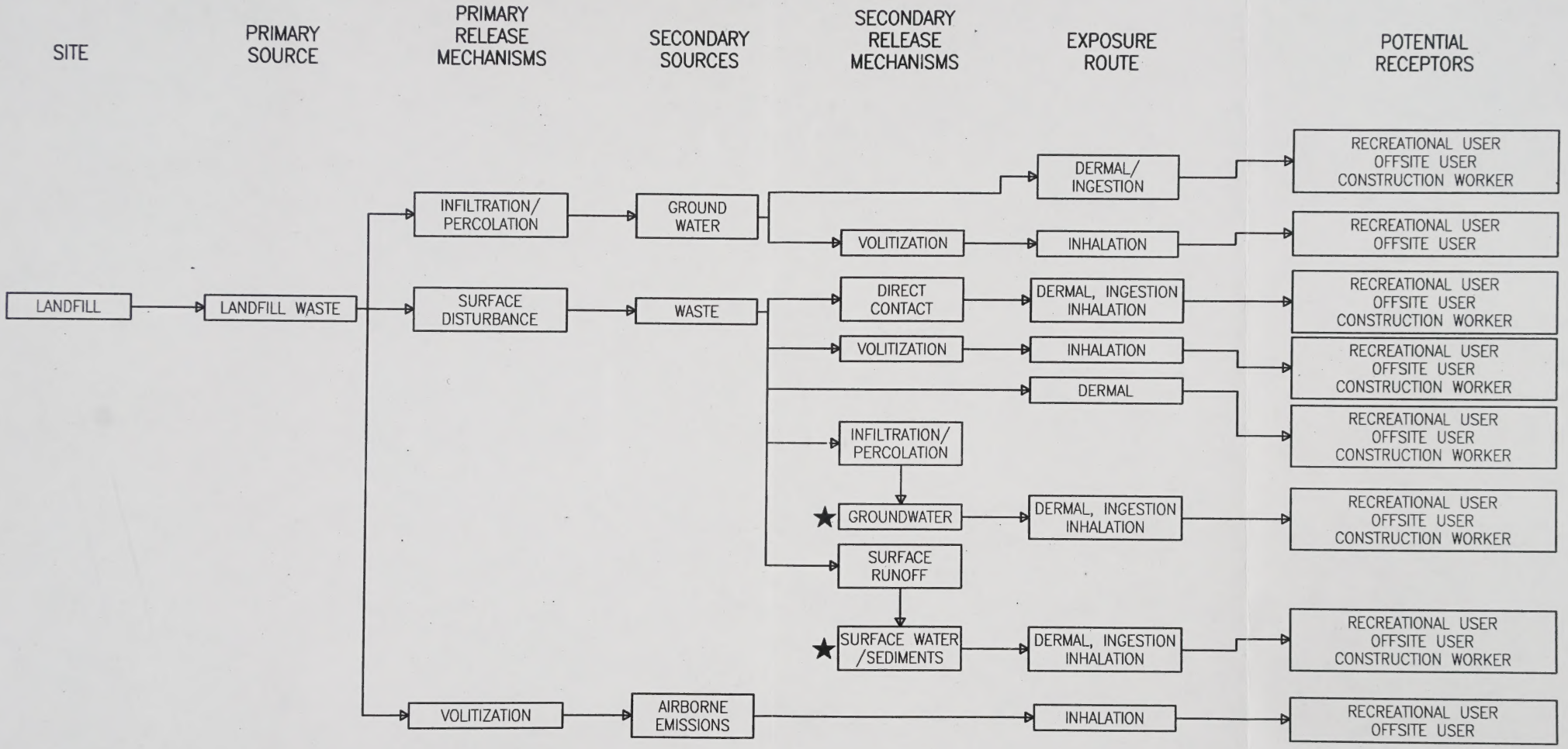

Targeted Brownfields Assessement
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Centennial Park
Helena, Montana

Human Health and Ecological Conceptual Site Model

Figure 5

April 2001

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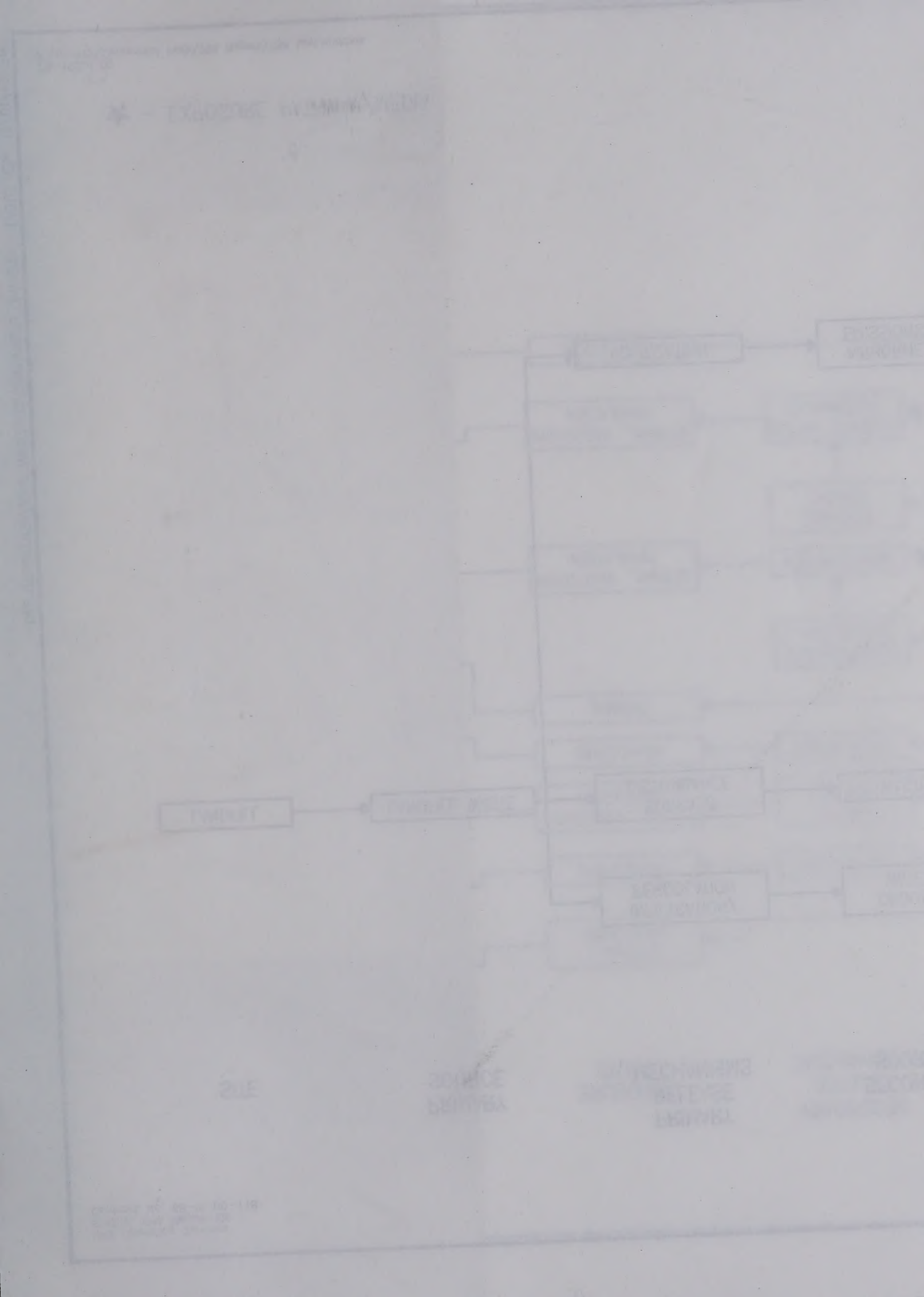

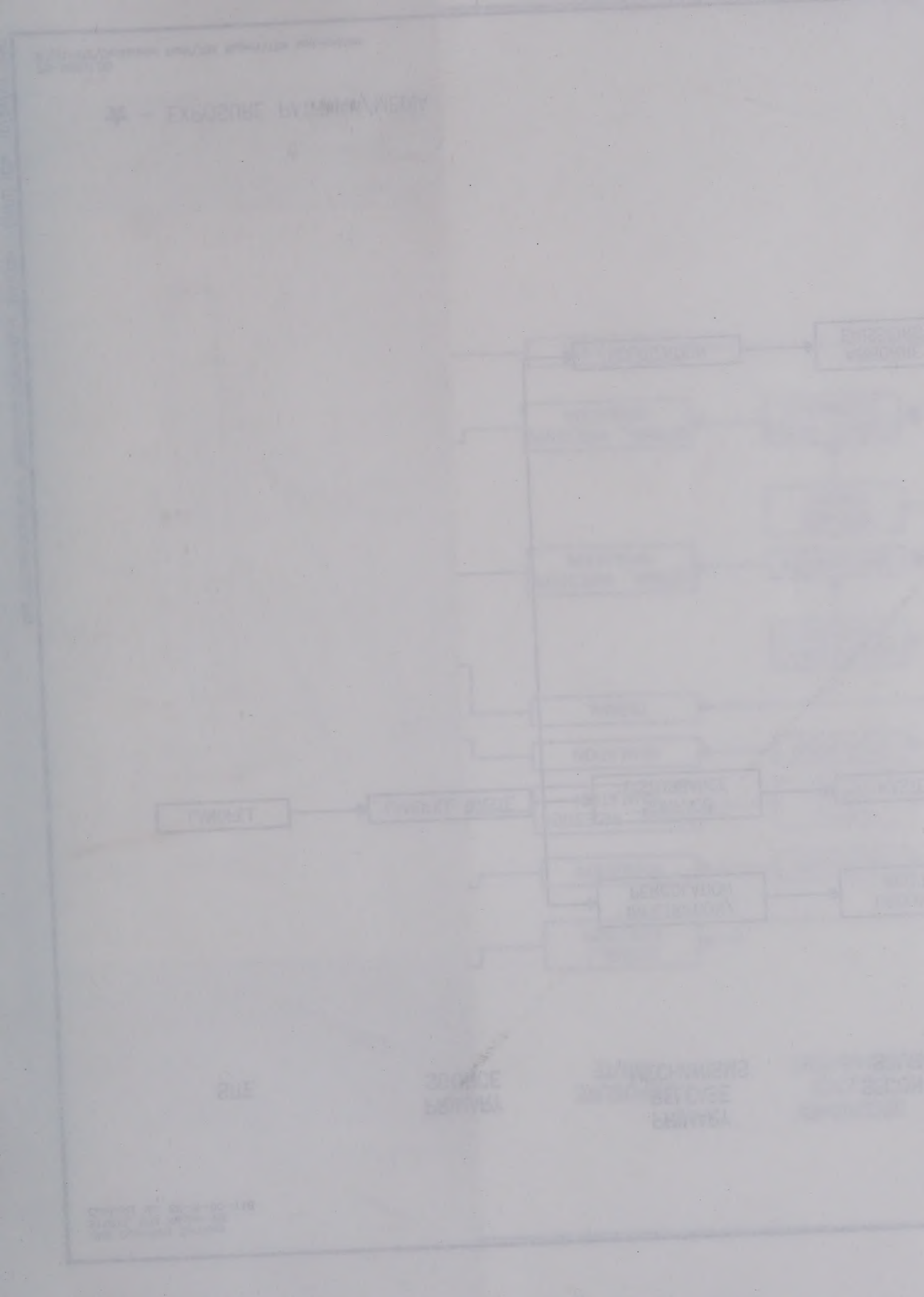

Centennial Park Master Plan

Final Master Plan

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CARL A. THUESEN NO. 5
MONTANA LICENSED LANDSCAPE ARCHITECT

Scale

97 Parking Spaces

Playground

Soccer Fields

Solid Waste Limit

96 Parking Spaces

Storm Water Detention

Slow Speed Park Drive

PHASE 1
includes 9 holes of flying disc golf

Softball Fields

Linkage Feature

Relocated power line

Soccer Field

PHASE 2
includes 9 holes of flying disc golf

154 Parking Spaces

Playground

Volleyball

Possible Expansion on State of Montana Property

Soccer Fields

Solid Waste Limit

YMCA

Existing Landscape Buffer

PHASE 3

North Main Street

Armory

335 Parking Spaces

Lyndale Ave.

Underpass from Great Northern Area Centennial Park

50' 0' 100' 200'

Centennial Park Master Plan
Final Master Plan

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CARL THUESEN A.S.L.A.
GOLF COURSE ARCHITECTURE
LANDSCAPE ARCHITECTURE

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SHEET 1 OF 1

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Nature Saver